

alloy, has been mentioned in previous reports. Extensive tests on a trial length, laid in deep water, indicate the commercial value of this type of cable, and verify the estimated increase in speed over that of all other types of deep sea cable. Since the first transatlantic cable of 1858, all cables have been of practically the same type, differing only in size and weight. Under an arrangement with La Compagnia Italiana dei Cavi Telegrafici Sottomarini, the Western Union

will lay a cable, of the new type referred to above, from New York city to Horta, in the Azores, and the Italian company will provide a cable from the Azores to Spain and Italy, establishing for the first time direct cable connection between the United States and these two important countries, and thus affording a much needed direct route for traffic with southern Europe and countries beyond. This cable will probably be ready for operation by the fall of 1924."

## Subway Eliminates Crossing With Peculiar Conditions

### Heavy Seasonal Pedestrian Traffic and Switching Movements Combine to Produce Undesirable Situation

*The conditions at the crossing herein described have existed for a number of years, but the solution of the problem was delayed, partly by the objections of a private property owner, and partly by the reluctance of a public commission to take the necessary action on the ground that it did not want to put the city to any expense, although the public, more largely than any other interest, was benefited. The solution of the problem, so far as the engineering features are concerned, was a simple one, and doubtless, had the commission had the authority to compel the railroad to bear the entire expense, it would have loudly demanded the elimination of the crossing some years ago.*

At Buffalo, N. Y., the Delaware Lackawanna & Western R. R. has a coal pier, located at the mouth of the Buffalo river which discharges its flow at the point where Lake Erie ends and the Niagara river commences. All the anthracite coal transported over this railroad destined for transfer to lake carries for both United States and Canadian lake ports, except Lake Ontario ports, is handled at this pier. The approach to the pier yard, or North Pier as it is known, is over a double track line laid in Water street between Commercial slip on the east and Evans slip on the west.

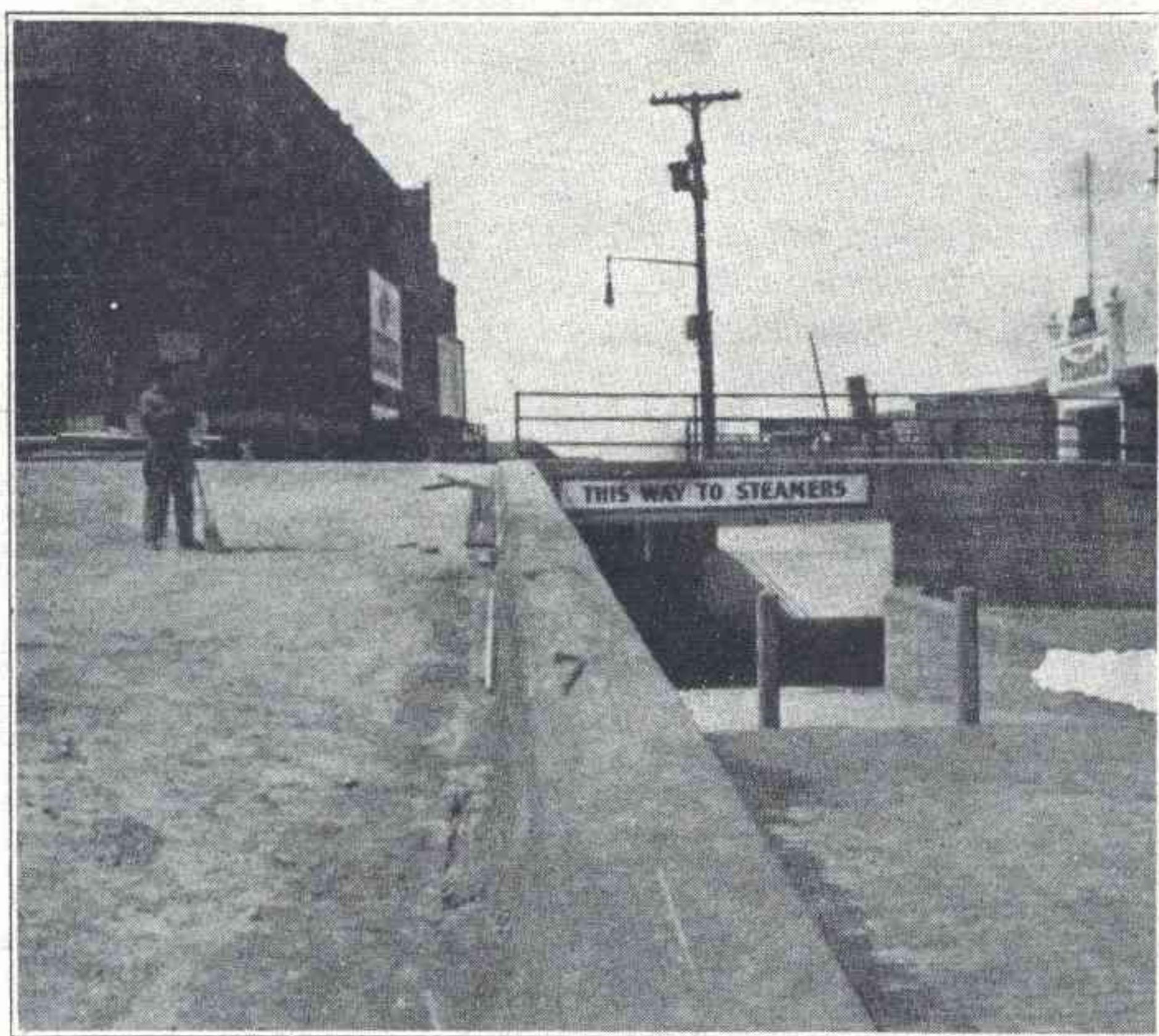
Because of the comparatively short length of the water front at North Pier the maximum capacity of any track is 18 cars. The track between the cross over just west of Commercial street and that west of Evans slip will hold 18 cars. It is, therefore, necessary that the incoming

trains of loads shall not have more than 36 cars. While the front cut of 18 cars is being disposed of, the track in Water street is occupied by the rear cut, and the engine must go to the rear of this cut and shove it onto a storage track or into the loaded yard.

During the season of navigation from 300 to 400 cars, and frequently in excess of this latter number, are handled daily at North Pier. It will readily be understood that the number of trains and switching movements necessary to handle these loads and return the empties is very large, and the street is frequently occupied for considerable periods.

Commercial slip opens into the Buffalo river about 100 ft. below the Lackawanna tracks. Commercial street, leading from Main street at the Terrace, to the dock of the Lake Erie Excursion Co., parallels the slip, lies nearly adjacent thereto, and crosses the tracks, which are at a considerable elevation due to the clearance requirement over the slip, almost at right angles. The main track serving North Pier is elevated over Main street and descends to Commercial street on a gradient of 1.6 per cent. From Commercial street west the gradient is 2.0 per cent for about 400 feet, to a point just west of State street.

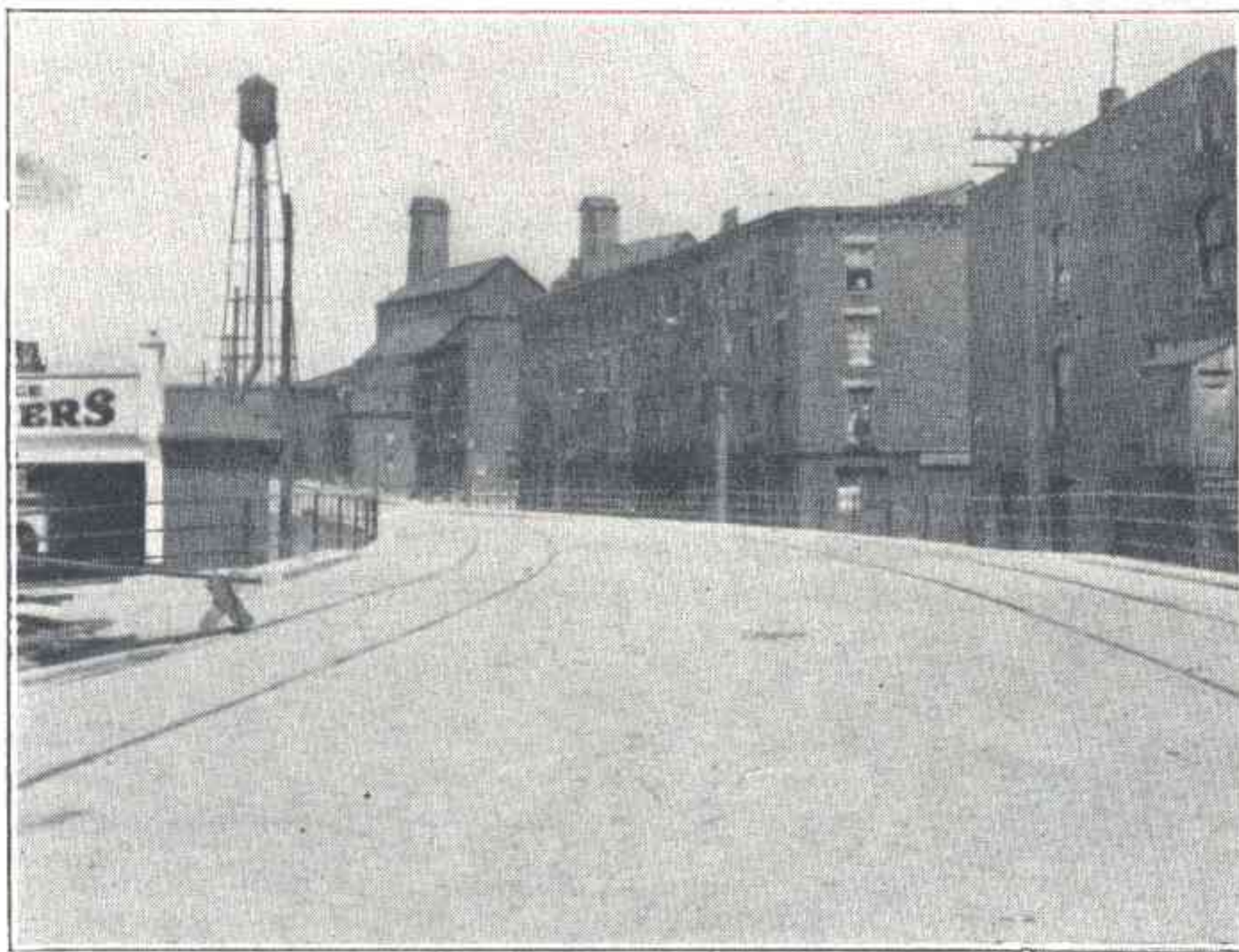
The Lake Erie Excursion Co. runs a line of boats to Crystal Beach, a summer resort on the Canadian shore of Lake Erie, about 12 miles from Buffalo. This is quite a popular resort, with dancing and bathing and the usual concessions which are found at a resort of this character. The season usually opens about May 20, and closes the night of labor day. For several years the patronage of these boats has averaged around 500,000 persons for



Entrance to Commercial Street Subway Looking South. Ramp for Vehicles at Left. Excursion Boat Background.



Looking North from River. Concrete Pavement in Front of Dock House in Foreground.



Looking West on Water Street, Commercial Street Subway. Lake Erie Excursion Co's. Dock House at Left.

the season, or a total of 1,000,000 in both directions, all of whom were compelled to cross the tracks at grade. A large majority of this patronage is made up of women and children, and while there have never been any casualties at the crossing, the danger of such an occurrence was great. Delays due to the occupation of the track by trains were frequent, and it was not unusual for quite a number of people to miss the boats, which run approximately on an hourly schedule, because they could not cross the tracks.

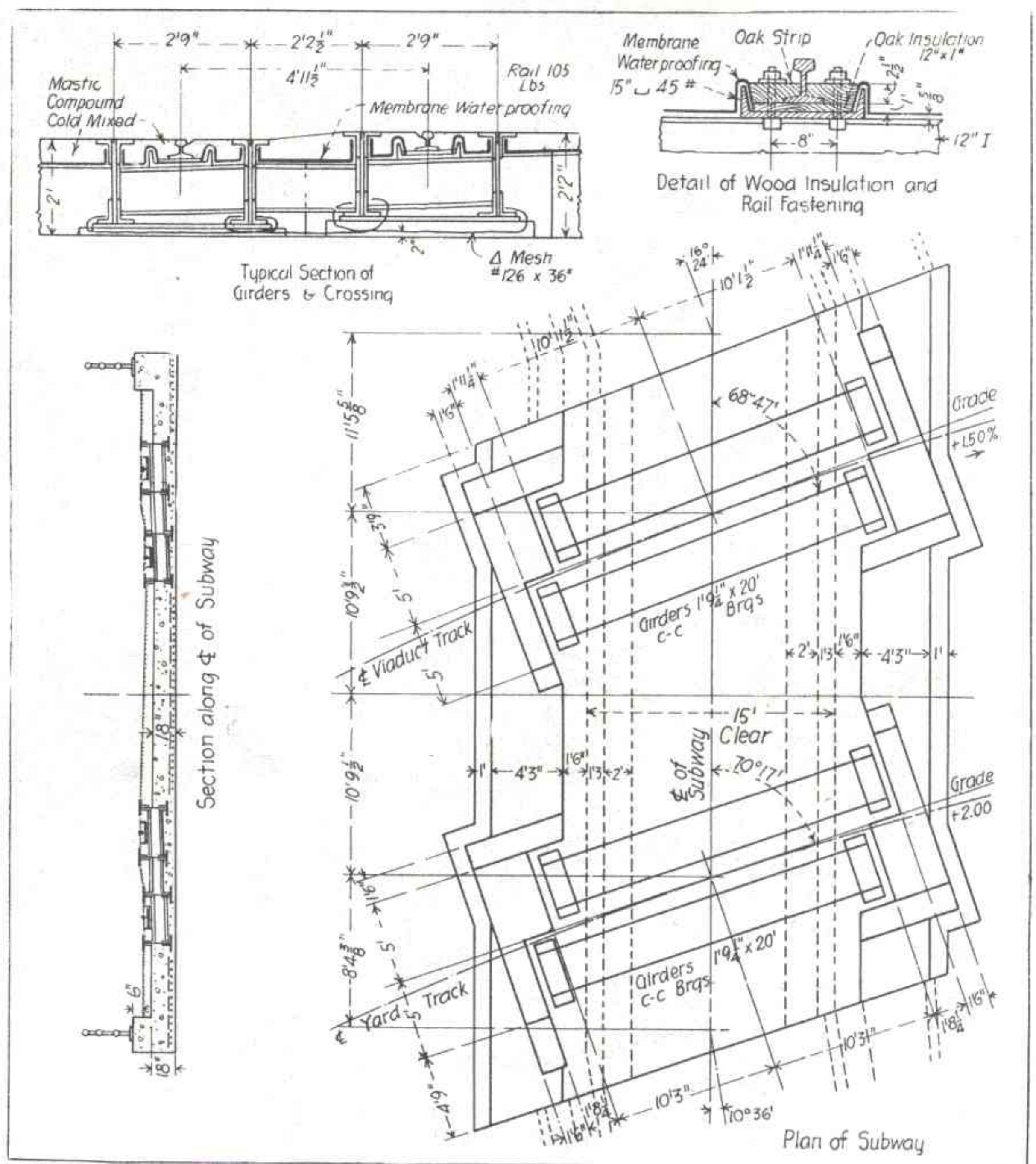
As might have been expected there was more or less agitation for the elimination of the crossing at grade and, with this end in view, negotiations were undertaken by the railroad. The Terminal Station Commission of Buffalo had jurisdiction but was unwilling to contribute to any part of the expense of the work. There were certain private interests strongly opposed to any plan suggested, and for several years the matter was deadlocked. Eventually the principal objector died, and his heirs withdrew the objections he had put forward. The negotiations were reopened and an amicable agreement reached by all the parties involved. The excursion company made a lump sum contribution and waived the question of damages to its property. The railroad bore the expense of constructing the subway and of the street changes, less the amount of the contribution referred to; the city assumed the burden of the damage to all property save that of the excursion company.

At Commercial and Water streets the tracks are on a ramp at an elevation of approximately five feet above the normal street grade. The ramp does not occupy the full width of Water street, but leaves room for one way vehicular traffic on the north. Approach ramps in Commercial street, both north and south of the tracks, occupy only part of the width of that street. Originally there was but one track across Commercial street and Commercial slip, the second track having been authorized by the Terminal Station Commission and its

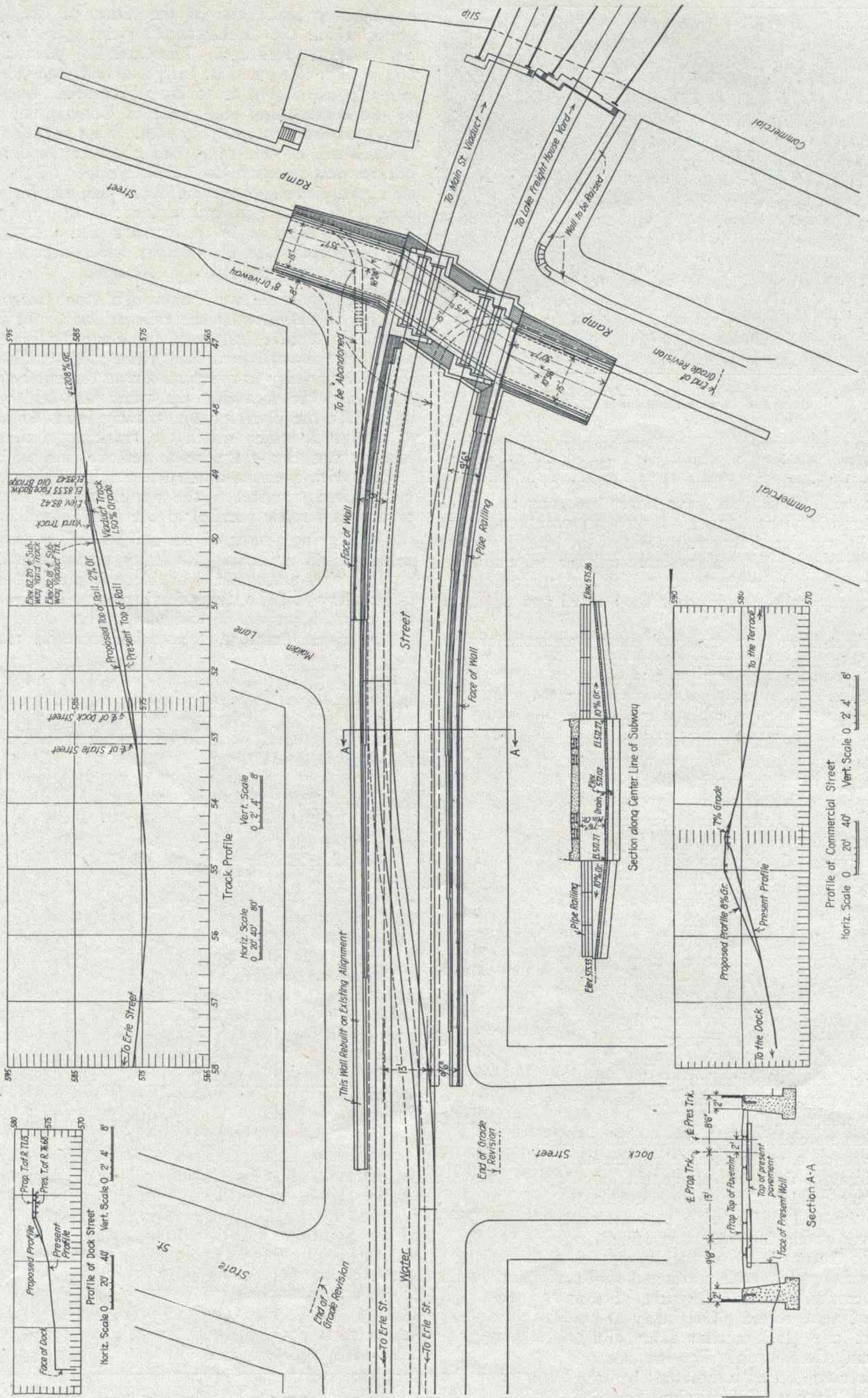
construction made one of the terms of the agreement under which the Lackawanna's passenger terminal was built several years ago. The track in question was not laid at that time, and in fact, not until the subway was under construction, as to lay it required the relocation of the south ramp wall west of Commercial street as shown on the accompanying plan. That portion of Water street south of this ramp had not been used for years, but for some reason the chief engineer of the commission refused to approve the detail plan for the construction. As such approval, under the agreement, was a condition precedent to the construction the work could not be started, and the benefits which accrue from the use of the track could not be secured.

The ramp walls were of rough stone masonry constructed in 1884, when the railroad was built into Buffalo. No trouble had been experienced with the south wall, but the north wall had given some trouble, having shown a tendency to overturn due to the extremely heavy traffic and the fact that the track was laid very close to it. As the plan for the subway included a revision of the grade which raised the track approximately one foot, it was thought wise to remove this wall and replace it with concrete construction. In addition the track was shifted two feet to the south, and the easterly end of the wall made parallel to the new alignment.

The bearing power of the soil in and around Buffalo is not at all uniform. At many points soils having a high bearing power are available, while only a short distance away will be areas having very low values. At this point, however, notwithstanding its close proximity to the river, excellent foundation material was found,



Details of Girders and Slab Over Commercial Street Subway.



Location Plan, Commercial Street Subway, Delaware Lackawanna & Western R. R., Buffalo, N. Y.

and the use of piling was not necessary. The footings were spread and toe reinforcement used. The elevation of the floor of the subway is 5.4 ft. above mean low water, and the footings are 4.8 ft. below the floor.

The subway is constructed with gravity abutments, and the tracks are carried on girders. This part of the design is somewhat unusual. The subway is intended for foot traffic only, as sufficient headroom could not be secured for vehicular traffic. It was not feasible to raise the tracks above their present elevation, as they occupy the street and are now located on the ramp which extends as far as Dock street. The fluctuations in lake level due to wind are large, and in addition there are frequent high water stages in the river, which has a large drainage area. To have placed the floor at a lower elevation would have resulted in frequent flooding. Records kept over a long period of time indicate that the water level will be above the floor of the subway as constructed only at infrequent intervals, and then for short periods. Furthermore the close proximity of the pier line did not permit the construction of an approach on the south if the subway was designed to give the necessary head room for vehicles.

For these reasons it is built for foot traffic only, and access to the property south of Water street by vehicles is provided by means of a grade crossing and the existing ramps just to the east of the subway, as shown on the plan. It is intended that this grade crossing shall be used temporarily by the steamer patrons in the event that the subway is flooded.

Because of these conditions it was desirable that the depth of the slab should be kept at a minimum. To accomplish this each rail is carried in a channel which in turn rests on floor beams between a pair of girders which serve that rail only. The superelevation for the curve is taken care of in these girders. The girders are encased in concrete up to a height which permits the laying of the pavement. Between the girders for each track and between tracks is a reinforced concrete slab, and the whole is waterproofed with Minwax, which is protected by a mastic compound.

The approaches and floor of the culvert are paved with concrete, and the excursion company has paved that portion of Commercial street in front of their passenger station with concrete, which extends to the pier line. That portion of the dock at the end of the street is of reinforced concrete construction, and was put in by the city several years ago. The pavement in Water street and on the approaches in Commercial street was removed and a new pavement of Medina sandstone, which is extensively used by the city, was laid. The old stone ramp wall in Commercial street was removed as far as the ends of the approaches and a concrete retaining wall between the ramps and approaches substituted.

The grades are so arranged that the low point is at the center of the subway, and the drainage from the approaches is led to a receiver which outlets by means of a sewer to the river. A back pressure valve is located in the sewer to prevent flooding of the subway, but it is expected that at high stages of the water there will be occasions when this will not be effective.

Lighting is accomplished by means of six 250-watt lamps in No-Glare fixtures, three on each side, set in recesses which were provided in the abutments.

The concrete for the footings, abutments and ramp walls is of a 1:5 mix. The aggregate being the pre-mixed Niagara river washed gravel used so extensively in and about Buffalo. For the slab a 1:4 mix of the same material was used.

It would have been impractical to have undertaken the

work during the season of navigation, and more particularly during the excursion season, as there was little room for a diversion of the excursion traffic. It would also have seriously interfered with the switching necessary to the operation of North Pier. For these reasons construction was not started until December, 1923, and is just now completed. In order to keep the line open to North Pier, where there is a team yard and a retail coal yard, and to avoid the expense of falsework, the south half of the structure and street work was first completed and put into service. The north track was then abandoned, and the north half of the work done.

It is pertinent to call attention to the fact that the concrete on this job was all put in, except the base for the paving, during severe winter conditions. Proper and adequate provision was made to protect it against low temperatures, and there is no evidence that it is of poorer quality than had it been put in during warm weather.

The work was done under the general direction of Geo. J. Ray, chief engineer. A. E. Deal, bridge engineer, designed the subway. The balance of the plans were worked out in the office of F. L. Wheaton, division engineer, who also had charge of the construction. Fred B. White, assistant engineer, was in charge of the field work.

The work was done under contract by the Rock Asphalt Corporation of Buffalo. Geo. Taber was superintendent for the contractor.

## Proposed Standardization of Electric Motors for Use With Machine Tools

The National Machine Tool Builders' Association has formally proposed to the American Engineering Standards Committee that there should be standardization of important dimensions of electric motors for use on machine tools. In presenting the recommendation to the latter organization, E. F. Dubrul, general manager of the machine tool association, stated:

"At the last meeting of the board of directors of this association, held on May 23, it was brought out that there should be some standardization of the dimensions of electric motors applied to machine tools. The board thereupon duly voted that we take up this question with the American Engineering Standards Committee, and ask that such standardization be initiated. In general I might say that great loss is caused to users of machine tools by the present lack of dimensional standardization, particularly in the distance between the motor feet, both longitudinally and laterally, and also the height of the motor shaft from the bottom of the feet. We feel that this distance could and should be standardized for motors of a given rating, so that the same base plates could be provided regardless of the make of motor. The number of revolutions being standardized, this dimensional standardization should to our minds, present no more grave difficulties."

What is believed to have been the biggest blast ever set off in the history of industry was recently fired near Ogden, Utah, to provide material for constructing the fills that are the approaches to the Great Salt Lake trestle of the Southern Pacific railroad. Earth and rock to an estimated volume of 550,000 cubic yards was raised and shattered by the explosion which used 301,200 pounds of black powder. A hill 275 feet high and covering a face of approximately 1,000 feet in length was lifted up and separated into fragments. The placing of the explosives in tunnels, aggregating 4,100 feet in length, occupied 25 men for 45 days.